

What is claimed is:

1. A sheet feeder for separating sheet materials stacked on a pivotable sheet material stacking member one by one from the topmost sheet material for feeding each of said sheet materials, said sheet feeder comprising:

a sheet feed roller configured to come in pressing contact with the topmost sheet material for feeding the sheet material to a separator; and

10 a tilt member configured to come in pressing contact with said sheet feed roller and including a tilt face, said sheet feed roller having a front end running against said tilt face, said tilt member having a contact face in contact with said sheet feed roller in the shape of an edge along an axial direction of said sheet feed roller.

2. A sheet feeder according to claim 1, wherein said tilt member is in pressing contact with said sheet feed roller for pivotal movement with respect to said sheet feed roller.

3. A sheet feeder according to claim 1, wherein said tilt member includes translating means for advancing and retracting said tilt member in parallel to an axis of said sheet feed roller.

4. A sheet feeder according to claim 3, wherein said translating means includes a rib formed on one of said tilt member and a feeder body, and a guide rail formed on the other.

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5. A sheet feeder according to claim 1, wherein said tilt member's contact face has a length which is less than an axial length of said sheet feed roller.

10 6. A sheet feeder according to claim 1, wherein said tilt member is formed of a synthetic resin, and includes a metal plate for covering at least the contact face with said sheet feed roller.

15 7. A sheet feeder according to claim 6, wherein said metal plate is elastic.

8. A sheet feeder according to claim 7, wherein said elastic metal plate is mounted from the tilt face so as to
20 surround said tilt member on both upper and lower sides.

9. A sheet feeder according to claim 1, wherein the distance in a sheet material convey direction between a location of said sheet feed roller at which said tilt member
25 is in pressing contact with said sheet feed roller and a

location of said sheet feed roller at which a sheet stacked
on said sheet material stacking member comes in contact with
said sheet feed roller is in a range of 2 mm to 6 mm, and
the angle of the tilt face of said tilt member to the sheet
5 material convey direction is in a range of 50° to 70°.

10. A sheet feeder according to claim 1, further
comprising a thin elastic member disposed at a location
downstream of a contact area of said sheet feed roller in
10 contact with said tilt member such that said thin elastic
member crosses a tangential direction of said contact area.

11. A sheet feeder according to claim 10, wherein said
thin elastic member comprises two members disposed at both
15 sides of said sheet feed roller.

12. A sheet feeder according to claim 10, wherein said
thin elastic member is disposed substantially at a center of
said sheet feed roller.

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13. A sheet feeder according to claim 1, further
comprising a thin elastic member crossing a tangential
direction of the contact area at a location downstream of
the contact area of said sheet feed roller with said tilt
25 member, said thin elastic member including a bent in the

shape of hook bent toward said sheet feed roller at a rear end.

14. A sheet feeder according to claim 13, wherein said
5 thin elastic member comprises two members disposed on both sides of said sheet feed roller.

15. A sheet feeder according to claim 13, wherein said
thin elastic member is disposed substantially at the center
10 of said sheet feed roller.

16. A sheet feeder according to claim 13, wherein said
thin elastic member crosses the tangential direction at an
angle ranging from 20° to 60°.

17. A sheet feeder according to claim 1, further
comprising a friction member crossing a tangential direction
to a contact area of said sheet feed roller in contact with
said tilt member at a location downstream of the contact
20 area.

18. A sheet feeder according to claim 17, wherein said
friction member comprises two members disposed at both sides
of said sheet feed roller.

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19. A sheet feeder according to claim 17, wherein said friction member is disposed substantially at a center of said sheet feed roller.

5 20. A sheet feeder according to claim 1, further comprising:

 a pressure lever having a free end configured to come in contact with and move away from said sheet material stacking member;

10 a sensing lever mounted coaxially with said pressure lever for pivotal movement associated with insertion/removal of a cassette having said sheet stacking member; and

 an elastic member disposed between said sensing lever and said pressure lever.

15 21. A sheet feeder according to claim 20, wherein said pressure lever is pivotally moved in association with said sensing lever when an angle of said pressure lever to said sensing lever is greater than a predetermined angle.

20 22. A sheet feeder according to claim 20, wherein said sensing lever includes a pair of arms at a free end thereof, said arms extending from both sides of said tilt member, wherein said sensing lever pivotally moves to cause said
25 arms to pass both sides of the contact area of said tilt

member.

23. A sheet feeder according to claim 20, wherein said
sensing lever includes spring pressure changing means for
5 adjusting an urging force of a compression spring for
pressing said tilt member onto said sheet feed roller.

24. A sheet feeder according to claim 23, further
comprising a spring bearer disposed slidably in an axial
10 direction of said compression spring on an opposite side of
said compression spring with respect to said tilt member,
wherein said spring pressure changing means engages with and
disengages from said spring bearer associated with pivotal
movement of said sensing lever, and said spring pressure
15 changing means drives said spring bearer toward said tilt
member when said spring pressure changing means engages with
said spring bearer.

25. A sheet feeder according to claim 1, further
20 comprising first cams disposed coaxially with said sheet
feed roller for separating said sheet material stacking
member from said sheet feed roller when said first cams come
in contact with both side ends of a front face of said sheet
material stacking member.

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26. A sheet feeder according to claim 25, wherein said sheet material stacking member includes pressor ribs at both side ends at a front face thereof, such that said first cams come in contact with said pressor ribs.

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27. A sheet feeder according to claim 25, further comprising second cams disposed coaxial with said sheet feed roller for separating said tilt member from said sheet feed roller when said second cams come in contact with both side ends of said tilt member.

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28. A sheet feeder according to claim 27, wherein said tilt member includes ribs at both side ends such that said second cams come in contact with said ribs.

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29. A sheet feeder according to claim 27, further comprising a tilt member holder plate between said second cams and said tilt member, said tilt member holder plate being formed with an opening for avoiding a site at which said sheet feed roller comes in contact with said tilt member, said tilt member holder plate having a leading end spaced apart from said sheet material stacking member.

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30. A sheet feeder for separating sheet materials stacked on a pivotable sheet material stacking member one by

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one from the topmost sheet material for feeding each of said sheet materials, said sheet feeder comprising:

sheet feed roller means for coming in pressing contact with the topmost sheet material for feeding the sheet

5 material to a separator; and

tilt member means for coming in press contact with said sheet feed roller means and including a tilt face, said sheet feed roller means having a front end running against said tilt face, said tilt member means having a contact face
10 in contact with said sheet feed roller means in the shape of an edge along an axial direction of said sheet feed roller means.

31. A sheet feeder according to claim 30, wherein said
15 tilt member means is in pressing contact with said sheet feed roller means for pivotal movement with respect to said sheet feed roller means.

32. A sheet feeder according to claim 30, wherein said
20 tilt member means includes translating means for advancing and retracting said tilt member means in parallel to an axis of said sheet feed roller means.

33. A sheet feeder according to claim 32, wherein said
25 translating means includes a rib formed on one of said tilt

member means and a feeder body, and a guide rail formed on the other.

34. A sheet feeder according to claim 30, wherein said
5 contact face of said tilt member has a length that is less than an axial length of said sheet feed roller means.

35. A sheet feeder according to claim 30, wherein said
10 tilt member means is formed of a synthetic resin, and includes a metal plate for covering at least the contact face with said sheet feed roller means.

36. A sheet feeder according to claim 35, wherein said
15 metal plate is elastic.

37. A sheet feeder according to claim 36, wherein said
elastic metal plate is mounted from the tilt face so as to surround said tilt member means on both upper and lower
sides.

20 38. A sheet feeder according to claim 30, wherein the distance in a sheet material convey direction between a location of said sheet feed roller means at which said tilt member means is in pressing contact with said sheet feed
25 roller means and a location of said sheet feed roller means

at which a sheet stacked on said sheet material stacking member comes in contact with said sheet feed roller means is in a range of 2 mm to 6 mm, and the angle of the tilt face of said tilt member means to the sheet material convey
5 direction is in a range of 50° to 70°.

39. A sheet feeder according to claim 30, further comprising thin elastic member means disposed at a location downstream of a contact area of said sheet feed roller means
10 in contact with said tilt member means such that said thin elastic member crosses a tangential direction of said contact area.

40. A sheet feeder according to claim 39, wherein said
15 thin elastic member means comprises two members disposed at both sides of said sheet feed roller means.

41. A sheet feeder according to claim 39, wherein said thin elastic member means is disposed substantially at a
20 center of said sheet feed roller means.

42. A sheet feeder according to claim 30, further comprising thin elastic member means crossing a tangential direction of the contact area at a location downstream of
25 the contact area of said sheet feed roller means with said

tilt member means, said thin elastic member means including
a bent in the shape of hook bent toward said sheet feed
roller means at a rear end.

5 43. A sheet feeder according to claim 42, wherein said
thin elastic member means comprises two members disposed on
both sides of said sheet feed roller means.

10 44. A sheet feeder according to claim 42, wherein said
thin elastic member means is disposed substantially at the
center of said sheet feed roller means.

15 45. A sheet feeder according to claim 42, wherein said
thin elastic member means crosses the tangential direction
at an angle ranging from 20° to 60°.

20 46. A sheet feeder according to claim 30, further
comprising friction member means crossing a tangential
direction to a contact area of said sheet feed roller means
in contact with said tilt member means at a location
downstream of the contact area.

25 47. A sheet feeder according to claim 46, wherein said
friction member means comprises two members disposed at both
sides of said sheet feed roller means.

48. A sheet feeder according to claim 46, wherein said friction member means is disposed substantially at a center of said sheet feed roller means.

5 49. A sheet feeder according to claim 30, further comprising:

 pressure lever means having a free end configured to come in contact with and move away from said sheet material stacking member;

10 sensing lever means mounted coaxially with said pressure lever means for pivotal movement associated with insertion/removal of a cassette having said sheet stacking member; and

 elastic member means disposed between said sensing
15 lever means and said pressure lever means.

 50. A sheet feeder according to claim 49, wherein said pressure lever means is pivotally moved in association with said sensing lever means when an angle of said pressure
20 lever means to said sensing lever means is greater than a predetermined angle.

 51. A sheet feeder according to claim 49, wherein said sensing lever means includes a pair of arms at a free end
25 thereof, said arms extending from both sides of said tilt

member means, wherein said sensing lever means pivotally moves to cause said arms to pass both sides of the contact area of said tilt member means.

5 52. A sheet feeder according to claim 49, wherein said sensing lever means includes spring pressure changing means for adjusting an urging force of a compression spring for pressing said tilt member means onto said sheet feed roller means.

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53. A sheet feeder according to claim 52, further comprising spring bearing means disposed slidably in an axial direction of said compression spring on an opposite side of said compression spring with respect to said tilt member means, wherein said spring pressure changing means engages with and disengages from said spring bearing means associated with pivotal movement of said sensing lever means, and said spring pressure changing means drives said spring bearing means toward said tilt member means when said spring pressure changing means engages with said spring bearing means.

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54. A sheet feeder according to claim 30, further comprising first cam means disposed coaxially with said sheet feed roller means for separating said sheet material

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stacking member from said sheet feed roller means when said first cam means come in contact with both side ends of a front face of said sheet material stacking member.

5 55. A sheet feeder according to claim 54, wherein said sheet material stacking member includes pressor rib means on both side ends at a front face thereof, such that said first cam means come in contact with said pressor rib means.

10 56. A sheet feeder according to claim 54, further comprising second cam means disposed coaxial with said sheet feed roller means for separating said tilt member means from said sheet feed roller means when said second cam means come in contact with both side ends of said tilt member means.

15 57. A sheet feeder according to claim 56, wherein said tilt member means includes rib means at both side ends such that said second cam means come in contact with said rib means.

20 58. A sheet feeder according to claim 56, further comprising tilt member holder plate means between said second cam means and said tilt member means, said tilt member holder plate means being formed with an opening for
25 avoiding a site at which said sheet feed roller means comes

in contact with said tilt member means, said tilt member holder plate means having a leading end spaced apart from said sheet material stacking member.

5 59. An image forming apparatus comprising:

 a sheet feeder that separates sheet materials stacked on a pivotable sheet material stacking member one by one from a topmost sheet material for feeding each of said sheet materials, said sheet feeder comprising:

10 a sheet feed roller configured to come in pressing contact with a topmost sheet material for feeding the sheet material to a separator; and

 a tilt member configured to come in pressing contact with said sheet feed roller and including a tilt face, said sheet feed roller having a front end running against said tilt face, said tilt member having a contact face in contact with said sheet feed roller in the shape of an edge along an axial direction of said sheet feed roller, and

20 an image forming mechanism configured to form an image on the sheet material fed out from said sheet feeder.

 60. An image forming apparatus comprising:

 sheet feed means for separating sheet materials stacked on a pivotable sheet material stacking member one by

one from a topmost sheet material for feeding each of said sheet materials, said sheet feeder comprising:

sheet feed roller means for coming in pressing contact with a topmost sheet material for feeding the sheet material to separating means; and

tilt member means for coming in pressing contact with said sheet feed roller means and including a tilt face, said sheet feed roller means having a front end running against said tilt face, said tilt member means having a contact face in contact with said sheet feed roller means in the shape of an edge along an axial direction of said sheet feed roller means, and

image forming means for forming an image on the sheet material fed out from said sheet feeding means.

61. A method of image forming, comprising the steps of:

causing a sheet feed roller to come in pressing contact with a topmost sheet material stacked on a pivotable sheet material stacking member so as to feed the sheet material to a separator; and

making a tilt member come in pressing contact with said sheet feed roller, said tilt member including a tilt face, said sheet feed roller having a front end running against said tilt face, said tilt member having a contact face in contact with said sheet feed roller in the shape of

an edge along an axial direction of said sheet feed roller.

62. A method of image forming, comprising the steps of:

causing a sheet feed roller to come in pressing

5 contact with a topmost sheet material stacked on a pivotable
sheet material stacking member so as to feed the sheet
material to a separator;

making a tilt member come in pressing contact with
said sheet feed roller, said tilt member including a tilt
10 face, said sheet feed roller having a front end running
against said tilt face, said tilt member having a contact
face in contact with said sheet feed roller in the shape of
an edge along an axial direction of said sheet feed roller;
and

15 forming an image on the sheet material fed out from
said sheet feeder.

63. A sheet feeder comprising:

a support for a stack of sheets including a topmost
20 sheet;

a rotationally mounted feed roller in pressing contact
with the topmost sheet in the stack and rotating
about an axis for frictionally feeding said
topmost sheet in a feeding direction;

25 a sheet separating member having at least one tilt face

at least a part of which is downstream from the support in said feed direction and further having at least one contact face urged in pressing contact with said feed roller;

5 sad pressing contact being (a) edge-shaped, (b) along a line parallel to the feed roller axis, and (c) downstream from said support in said feeding direction;

10 said topmost sheet being fed in the feeding direction by said feed roller and being directed toward said edge-shaped pressing contact by said tilt face, and said edge-shaped pressing contact being operative to pass the topmost sheet between said at least one contact face and said feed roller but
15 prevent passage therethrough of a sheet from the stack frictionally engaged with the topmost sheet and moving therewith in the feeding direction.

64. A sheet feeding method comprising:

20 providing a stack of sheets including a topmost sheet; feeding the topmost sheet in a feeding direction using a rotating feed roller in frictional contact therewith;
using a pressing contact between the feed roller and at
25 least one contact face of a separating member to

pass the topmost sheet therethrough but keep from
passage a sheet from the stack that is in
frictional contact with the topmost sheet and is
moving therewith in the feeding direction;

- 5 said using step comprising using a pressing contact
that is edge-shaped and extends along a line
parallel to a rotational axis of the feed roller.